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None

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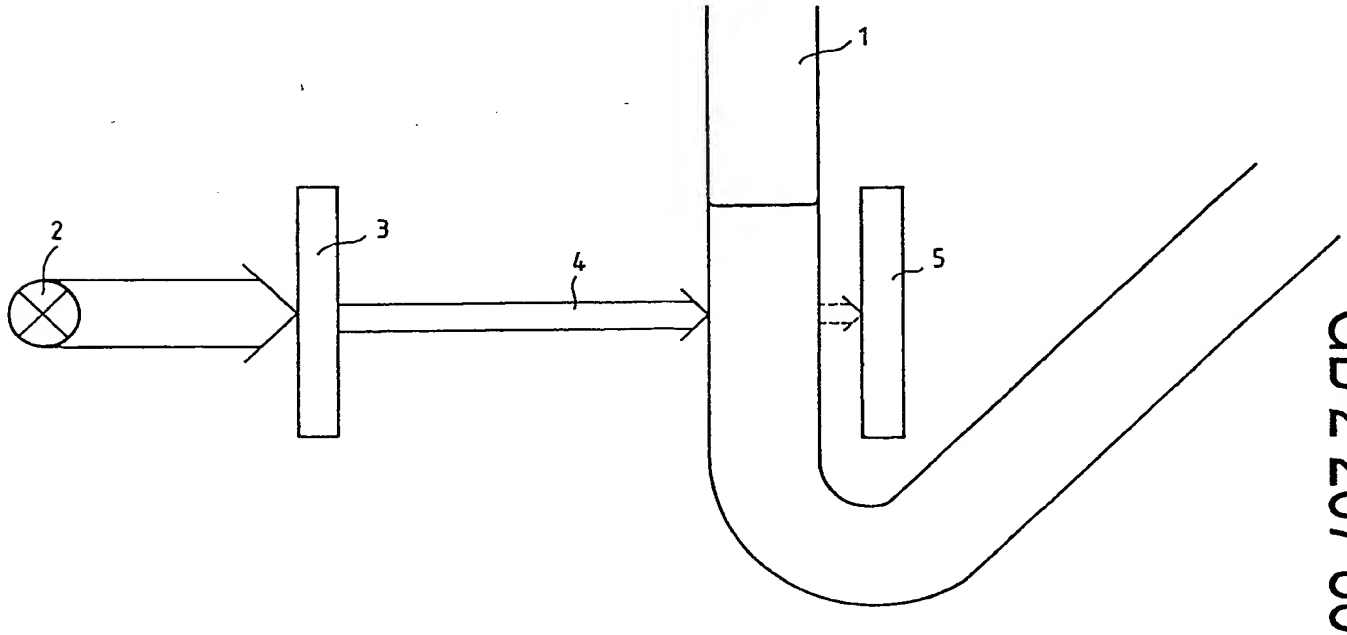
(54) Method of and device for determining the degree of fouling of a printing unit of a printing machine

(57) A device for determining the degree of fouling of a printing unit of a printing machine comprises a light beam 4 directed through a transparent pipe 1, down which the waste washing solution flows, towards an optical sensor 5 which compares the intensity of the transmitted light with that when clean solution is flowing. A filter 3 of the complementary colour to the ink used may be inserted in the white light beam. If the intensity of the transmitted light is low then the density of ink is high and further washing runs may be required. Alternative methods of measurement disclosed include chemical tests, density and electrical conductivity.

Fig.1



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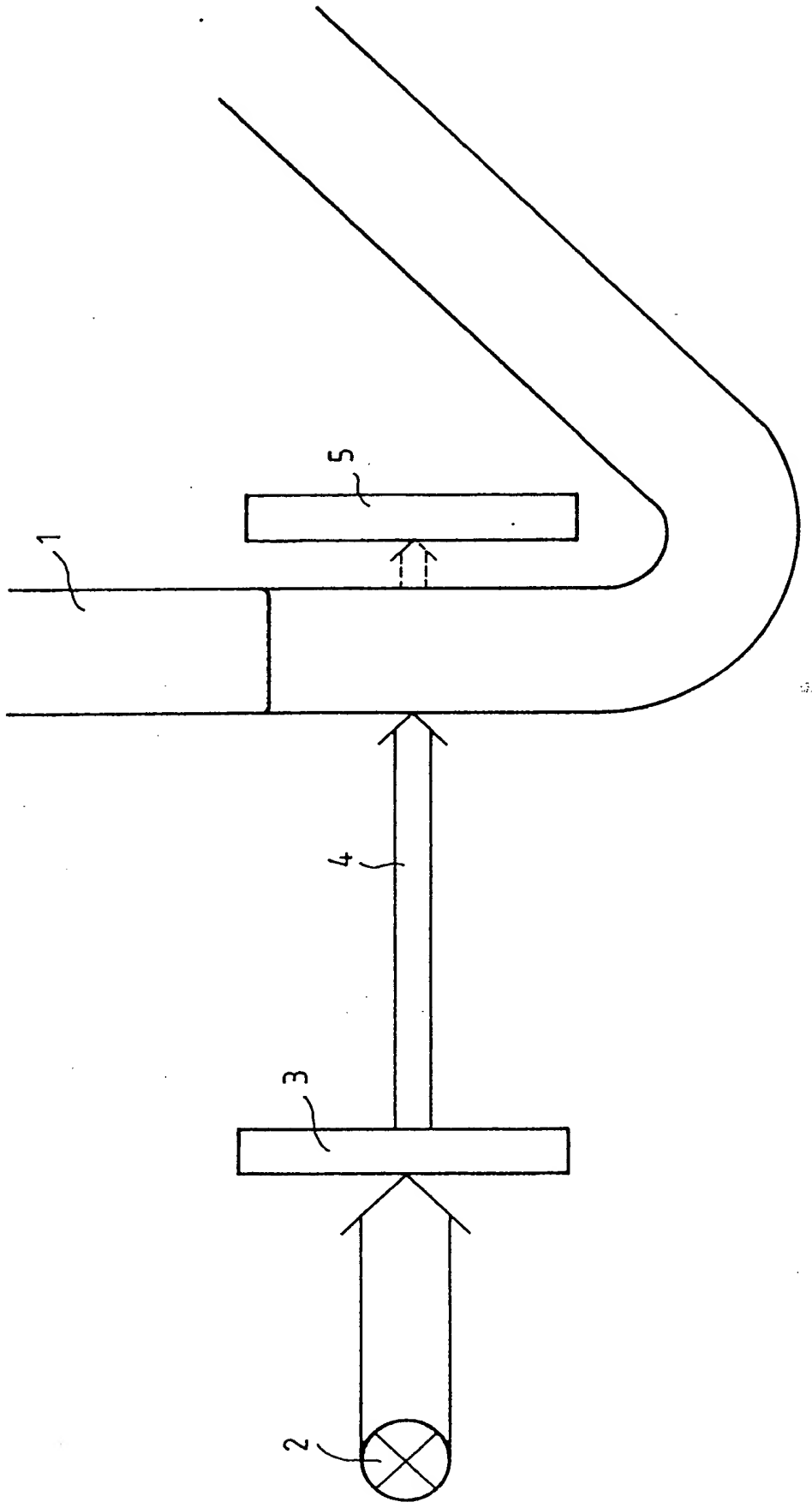

Fig.1

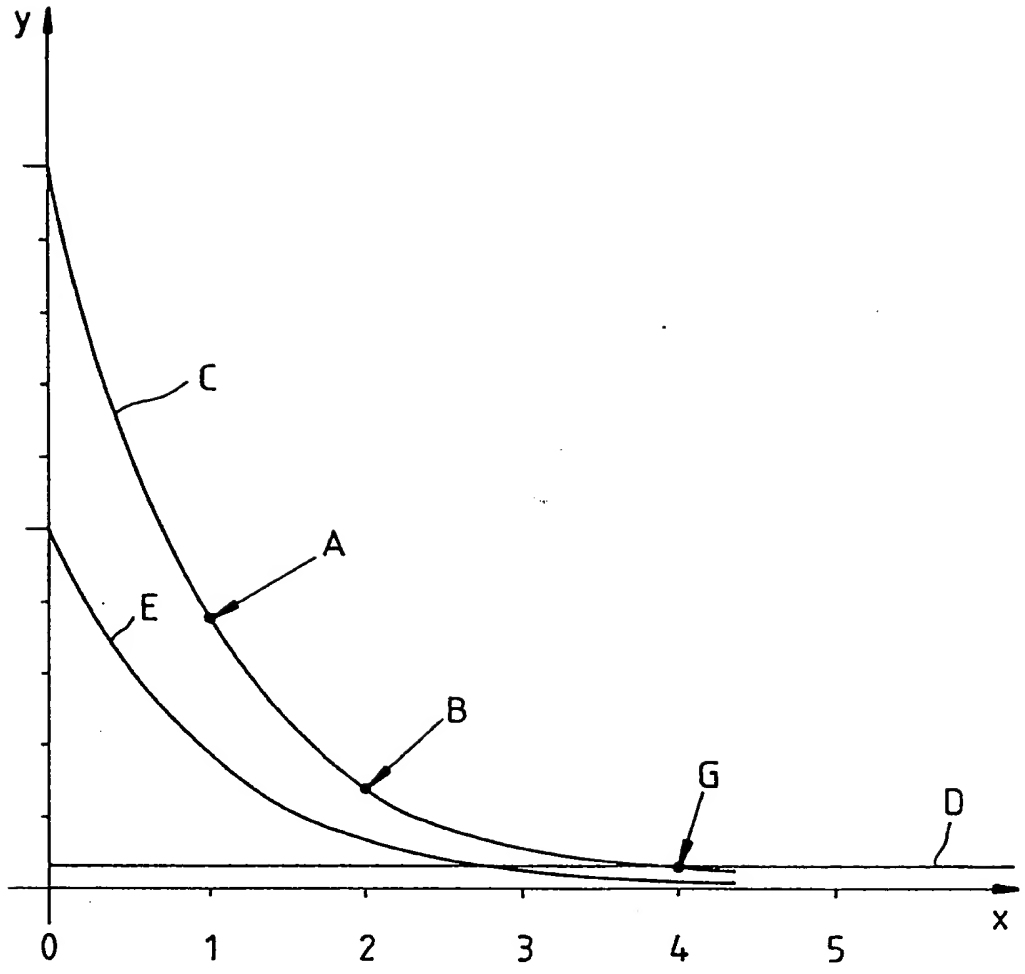

Fig.2

METHOD OF AND DEVICE FOR DETERMINING THE DEGREE OF FOULING OF A PRINTING UNIT OF A PRINTING MACHINE

The invention relates a method of and a device for determining the degree of fouling of a printing unit of a printing machine.

Up to now the washing of the blanket, the impression cylinder, or the inking unit of an offset printing machine, for example, is effected empirically, i.e. the pressman has to determine the point of time of the washing cycle and the number of spraying runs per washing cycle. Alternatively the washing programmes may be set up such that a washing cycle is performed at a fixed point of time depending on the type of machine or the print job. In so doing, there may be cases in which a fixed amount of washing solution is used up, although less washing solution would suffice for the washing, which could also result in a shorter washing cycle consisting of individual spraying runs. This rather inprecise estimation of the pressman is accompanied by the increased risk due to the effects of the washing solution which may be toxic, explosive or detrimental to the environment.

The DE-OS 15 98 831 describes a device for measuring the opaqueness of a fluid, a device which is particularly suited to measure the degree of opaqueness of fluids containing a high concentration of an opaque agent.

Further methods of determining the degree of fouling of an opaque fluid are also conceivable such as, for example, physical, chemical or electrochemical techniques.

It is therefore the object of the invention to provide a possibility of controlling the fouling of a washing device by determining the degree of fouling of the washing solution of a washing device of a printing machine, thus reducing the duration of the washing cycle on one hand and saving washing solution on the other hand.

According to the invention this object is achieved in that the degree of fouling of the printing unit is indirectly determined via the degree of fouling of the washing solution.

Furthermore, this object is achieved by means of a device comprising a transparent pipe through which the washing solution flows, a light source for which light and an optical sensor, the white light permeating said pipe and hitting the sensor.

During the washing cycle the dirt particles (for example, ink particles) come off the cylinders or rollers and are removed together with the washing solution. Thus, the washing solution differs in quality prior to the washing cycle and upon completion of the washing cycle. The invention presents a method determining the degree of fouling of a printing unit, for example, by defining the degree of fouling of the washing solution. This method makes it possible to obtain information on the impurities still contained in the respective device of the printing machine. If there is no difference in the washing solution prior to the washing cycle and after the washing cycle, one may infer that there are no impurities on the devices of the printing machine to be cleaned. If the impurities which have come off are absorbed by a felt cloth, it is conceivable to infer from the fouling of the felt cloth to the condition of the device of the printing machine to be cleaned.

The degree of fouling is preferably defined by determining a characteristic curve on the basis of the measurement of the degree of fouling of the washing solution after, at least, the first two spraying runs of a washing cycle, said characteristic curve indicating the relation between the degree of fouling of the washing solution and the number of spraying runs, and by pre-determining the number of spraying runs required per washing cycle on the basis of this function.

The washing cycle may be described by means of a function, plotting the degree of fouling of the washing solution versus the number of spraying runs required per washing cycle results in the curve behaviour of the function. Preferably this is a function of the form $y=ae^{-bx}$ or a similar function. If two points of this function which may be determined after, at least, two spraying runs are known it is possible to mark the points measured and to plot the selected curve. As experience shows there is little sense in continuing the washing cycle after having reached a certain degree of cleanliness of the printing unit, the function makes it possible to pre-determine when the washing cycle should be completed.

According to a further preferred specimen embodiment the degree of fouling of the washing solution may be determined optically via the degree of absorption of the washing solution.

Furthermore, it may be advantageous to use other measuring techniques. Conceivable are thus, for example, chemical proofs in the form of reactions as well as physical measurements via a density determination. Furthermore, the degree of fouling may be determined via measurements of the electrical conductivity, conductive substances being added to the printing ink, if necessary.

A preferred device for implementing the above-mentioned method comprises a transparent pipe through which the washing solution flows, a light source for white light and an optical sensor, the white light permeating the pipe and hitting the sensor.

A further preferred specimen embodiment of the device consists in that there is provided a colour filter between the light source and the pipe, said colour filter featuring the respective colour complementary to the ink contained in the printing unit.

This way a colour-specific determination can be achieved. A colour filter (for example, red, green, or blue) is provided between the light source of the white light and the pipe through which the fouled washing solution flows. The now coloured light (red, green, or blue) is led through the pipe and the respective ink component (cyan, magenta, yellow) contained in the washing solution is determined by means of an optical sensor.

The invention is illustrated with reference to a specimen embodiment.

Fig. 1 shows a device for determining the degree of fouling, and

Fig. 2 shows three possible characteristic curves.

Fig. 1 shows a transparent pipe (1) through which the fouled washing solution flows. Said pipe (1) is permeated by light beams from a light source (2) of white light which has been led through a coloured filter (3) beforehand. Depending on the respective printing ink said coloured filter (3) features the colour which is complementary to said printing ink, this

being generally red, green, or blue, so that the pipe (1) through which the fouled washing solution flows is permeated by red, green, or blue light (4). If the washing solution is fouled by the inks cyan, magenta, or yellow, then red, green, or blue light (4) is absorbed in the pipe (1). The degree of absorption is measured by means of an optical sensor. The optical sensor is calibrated in that clean washing solution is led through said pipe (1). The degree of fouling results from the ratio between the value determined for the clean washing solution and the value obtained for the fouled washing solution.

Fig. 2 shows a coordinate system. On the x axis there is plotted the number of spraying runs required per washing cycle. The degree of fouling of the washing solution is represented on the y axis. This coordinate system features three curves C, D, and E. Curve C is a function indicating a high degree of fouling of the printing unit. Curve E stand for average fouling, and constant D represents a value at which no further spraying runs are required.

The first spraying run of the washing cycle brings about a degree of fouling A, for example; the second spraying run a degree of fouling B. A curve C having the form $y = ae^{-bx}$ is plotted through these points A and B. Now it can be predicted that, due to the approximate point of intersection of constant D and curve C, this washing cycle does not require more than four spraying runs.

Furthermore, it is conceivable that the washing cycle is effected continuously, the washing solution being added constantly, i.e. without spraying runs.

Moreover, the duration of the washing cycle may be determined by constantly comparing the degree of fouling of the used washing solution with the unused washing solution.

The essential advantage thereof is that the duration of the washing cycle, i.e. the number of spraying runs, may be minimized, and thus washing solution saved.

It will of course be understood that the present invention has been described above purely by way of example, and modifications of detail can be made within the scope of the invention.

CLAIMS:

1. Method of determining the degree of fouling of a printing unit of a printing machine, wherein the degree of fouling of the printing unit is determined indirectly via the degree of fouling of the washing solution.

2. Method according to claim 1, wherein a characteristic curve is determined on the basis of the measurement of the degree of fouling of the washing solution made after at least the first two spraying runs of a washing cycle, said characteristic curve representing the relation between the degree of fouling of the washing solution and the number of spraying runs, this function making it possible to predetermine the number of spraying runs required per washing cycle.

3. Method according to claim 1 or 2, wherein the degree of fouling of the washing solution is determined optically via the degree of absorption.

4. Method according to claim 1 or 2, wherein the degree of fouling is determined via a chemical proof in the form of a reaction.

5. Method according to claim 1 or 2, wherein the degree of fouling is measured physically via a density determination.

6. Method according to claim 1 or 2, wherein the degree of fouling is determined by measuring the electrical conductivity, conductive substances being added to the printing ink, if necessary.

7. Method according to any one of the preceding claims, wherein the washing solution may be used several times depending on the degree of fouling of said washing solution.

8. Device for the implementation of the method according

to claims 1-3 comprising a transparent pipe through which the washing solution flows, a light source for white light and an optical sensor, said white light permeating said pipe and hitting said sensor.

9. Device according to claim 8, wherein a colour filter featuring the respective colour complementary to the ink is contained in the printing unit.

10. A method of determining the degree of fouling of a printing unit of a printing machine according to claim 1 and substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

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Relevant Technical fields

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(ii) Int Cl (Edition 5) B41F

Search Examiner
M J RICHARDSON

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Date of Search
20 JULY 1993

Documents considered relevant following a search in respect of claims 1-10

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
	NONE	

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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